Mining Truck T 284

Gross Vehicle Weight (GVW):	600 t / 661 ton
Payload Class:	363 t / 400 ton
Empty Vehicle Weight (EVW):	237 t / 261 ton

LIEBHERR

T 284

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Empty Vehicle Weight (EVW):	237 t / 261 ton

Productivity
Liebherr Mining Equipment enables superior productivity by loading and hauling maximum tonnage in the shortest amount of time.

Efficiency
Liebherr combines the proven capabilities of previous models with new features that improve operational efficiency.

Reliability
To maximize equipment reliability, Liebherr combines manufacturing expertise with superior monitoring and diagnostic capabilities.

Customer Support
Liebherr builds more than just mining equipment; Liebherr also builds customer partnerships.

Safety
Mining demands an ever-vigilant focus on safety, and Liebherr strictly adheres to industry standards. Liebherr equipment is designed to diminish risk even under the most extreme mining conditions.

Environment
Liebherr optimizes mining equipment for fuel economy, emission compliance, and extended service intervals.

Multiple loading tools

Liebherr mining trucks are designed to match large electric shovels and wheel loaders. The T 284 is suited for both the Liebherr R 9800 and the R 996 B hydraulic excavator. This combination of machines makes for a complete Liebherr solution.

Productivity

By maximizing payload while minimizing cycle time, Liebherr high-horsepower equipment moves more tons per hour.

Largest payload

Ultra class trucks have proven to be a more productive means of moving material. As the designer and manufacturer of the first 400 ton (363 t) mining truck, Liebherr has been at the forefront of this successful industry solution. By hauling more per cycle, the T 284 allows Customers to maximize the return on their investment and to meet production targets with fewer trucks or in less time.

Unmatched performance

The combination of the T 284's efficient Litronic Plus AC drive system, its high-power (up to 4,023 HP / 3.000 kW) engine, and low gross vehicle weight leads to fast haul cycle times with higher speeds on grade if compared to other trucks in its class.

Flexible engine options

The T 284 supports multiple engine options with power ratings up to 4,023 HP (3.000 kW). With application-specific recommendations from Liebherr, Customers are able to select the engine that will allow the truck to meet productivity targets while minimizing fuel consumption.

Drivability

Liebherr is committed to designing mining trucks that operators want to drive. The T 284 fulfills this commitment and promotes driver efficiency with its superior comfort, acceleration and handling.

Lightweight design

Liebherr's trademark low EVW is achieved by utilizing an electric drive system combined with a lightweight frame. Hauling the largest available payload with a lighter truck maximizes Customer productivity.

Wheel motors

The T 284's AC induction motors efficiently convert electrical power into mechanical torque. Fewer electrical losses translate into higher rimpull forces for faster cycle times and increased fuel economy.

Efficiency

Efficiency is a key ingredient for a successful mining operation. Liebherr mining equipment enables Customers to enjoy unrivaled performance while reducing cost per ton.

Litronic Plus technology

Developed and built by Liebherr, the proven Litronic Plus drive system determines the optimal way to extract power from the diesel engine. Efficient loading of the engine is critical to minimize fuel consumption and maximize performance.

Intelligent power usage

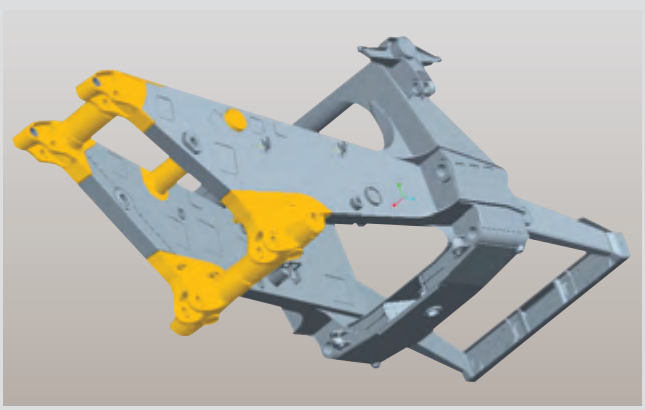
Engine power usage is optimized by running auxiliary components such as pumps, fans and motors only when needed. Fuel is conserved when the engine is idling and more power is available to accelerate the truck and climb grades when necessary.

Long life components

Components are built to perform in the most extreme mining conditions in order to allow more time between overhauls and to reach their maximum operational life.

Engine / Fuel system

The T 284 offers reliable engine options with the latest fuel injection technology for cleaner combustion and reduced fuel consumption. Customers can expect reduced maintenance and lower fuel costs.



Frame

The T 284's frame is designed according to international weld fatigue guidelines, and is fabricated according to American Welding Society standards. This steel structure includes cast components in strategic areas and hollow box rails with fully welded internal stiffeners. These choices ensure a durable, lightweight frame.

Reliability

Liebherr draws upon a wealth of experience while incorporating new technologies into its products to provide Customers with high quality equipment and services.

Experience

Millions of operating hours and years of design experience have come together to create the Liebherr T 284. With a history of products with proven reliability in the harshest mining environments, Liebherr Customers can count on consistent performance.

Advanced engineering tools

Liebherr's structural design process includes advanced software tools to ensure that the T 284 will perform reliably under the most demanding operating conditions. Some of the tools include:

- Multi-body Dynamic Simulations
- 3D modeling
- Finite Element Analysis (FEA)
- Structural Fatigue Life prediction software

Diagnostics

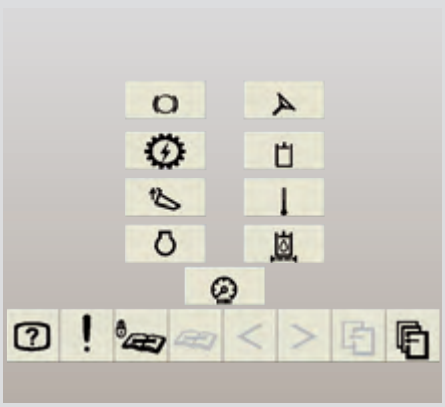
The integrated electronic system monitors, records, and outputs vital truck health and performance data. Data is stored and available for download to perform detailed analysis. This system supports predictive maintenance strategies to minimize unscheduled downtime.

Truck data is readily available to fleet dispatch or monitoring systems through a dedicated port using open communication protocols. This allows Customers the flexibility to choose systems which support their maintenance, operations, and business process requirements.

Integrated dash display

The monitoring system includes an onboard 12" (30 cm) touch-screen display. Intuitive menus and user-friendly screens provide operators and technicians with real-time truck information.

In addition to the standard operator screen, password protected diagnostic screens display live data such as temperatures and pressures for detailed troubleshooting.



Extended component life

Liebherr Mining exchange components enable Customers to minimize the total lifecycle cost of owning and operating a Liebherr mining truck or excavator while maintaining peak productivity and reliability.

All exchange components are built to OEM standards, offering same-as-new warranties.

Customer Support

Liebherr is committed to maintaining a full life cycle service organization as well as a global parts warehousing and remanufacturing network.

Product support

Liebherr product support provides the vital interface between the Customer and the OEM. There are different levels of product support available:

- Assembly
- Maintenance advice
- Troubleshooting assistance
- Technical expertise

Product support personnel work with Customers from the assembly of a truck throughout its operating life.

Product upgrade programs

Liebherr offers component and system upgrades as advances in technology, innovation in design, and manufacturing improvements become available. The product upgrades can improve performance, reliability and safety.

Parts support and logistics

Liebherr forecasts parts requirements on a global basis and optimizes inventories to meet Customers' needs. A 24/7 on-call service is available to ensure prompt response.

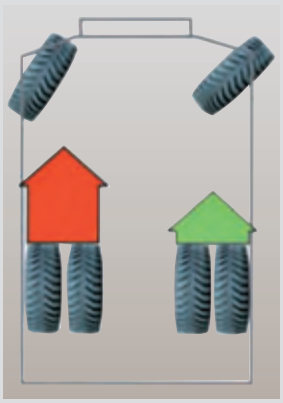
Training

The Liebherr Mining Training System provides operator and field service technicians with world-class operational and technical training.

- Operator training
- Basic and advanced service technician training
- Hands-on troubleshooting training

Stability and control

The advanced Traction Control System with four-wheel speed sensing capability automatically adjusts torque to the rear wheels to maximize traction when cornering, accelerating from a standstill, or traveling down wet or icy roads.
Developed by Liebherr exclusively for mining trucks, this system enables operators to consistently maintain steering control and truck stability.



Safety

Liebherr designs and builds safety into every piece of mining equipment, and is committed to providing a safe and healthy working environment for the operator and service personnel.

Operator safety

The T 284 cab is designed to be a safe, comfortable and productive environment for operators. The cab provides maximum visibility and is certified for roll-over and falling-object protection. All Liebherr trucks offer at least two safety routes from the cab to the ground.

Service personnel safety

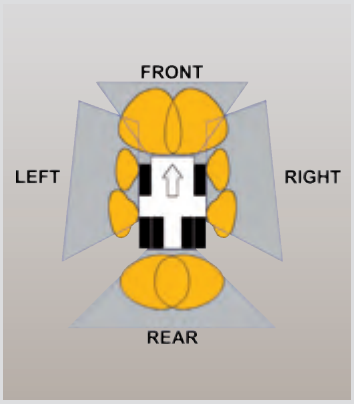
Liebherr mining trucks are equipped with ladders and walkways that allow easy engine access. The low working heights of maintenance areas provide safe and efficient service access.

- Access to the engine and alternator from both sides of the chassis
- Ground level filling points for fuel, hydraulic oil, grease and coolant
- Hydraulic filters and battery isolation box accessible from ground level
- Dual access into axle box for maintenance and inspection
- Tie offs for safety harnesses

Operational safety

In order to maintain a safe working environment, the T 284 offers the following features.

- Payload overload warnings
- Anti-roll back feature active in forward and reverse
- Certified steering and braking accumulators
- High visibility LED running and service lights
- Emergency stop buttons in cab and at ground level



Operator assist features (optional)

- Vision system provides the additional viewing angles around the truck to eliminate blind spots
- Detection system alerts the operator when an object is in close proximity to the stationary truck
- Fatigue system provides real-time monitoring of the operator for fatigue and distraction events while the truck is in motion.

Fewer carbon-based consumables

The T 284 uses fewer consumables compared to similar class trucks. It requires less service time and reduces the costs of handling and disposing of waste.

Environment

In order to minimize the impact on the environment, Liebherr designs and builds mining equipment with the smallest possible environmental footprint.

Low emissions

By partnering with the leading providers of high speed diesel engines, Liebherr is able to offer engine options for the T 284 with the latest emission technology to satisfy US EPA emissions requirements.

Fuel efficiency

Liebherr's Litronic Plus drive system paired with the latest engine technology provides excellent fuel economy. Lowering the fuel consumption of the truck fleet can significantly reduce the carbon footprint of the entire operation.

Component exchange

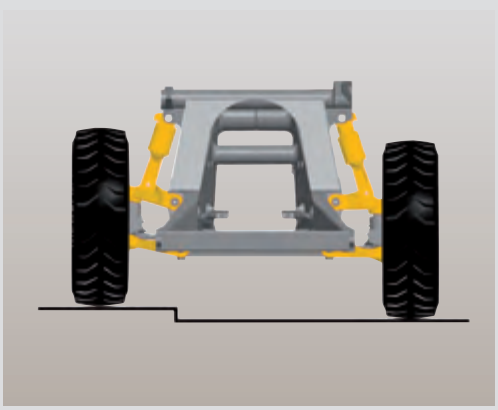
The Liebherr exchange program extends component life cycles. The program employs condition-based replacements that reduce unplanned maintenance. Liebherr also reduces waste by overhauling components using original core parts.

Sound solutions

Factory engineered "quiet-truck" packages featuring a low speed engine fan, enclosed engine bay, and custom mufflers drastically reduce the truck noise emissions. Day or night, this ultra quiet truck gives Customers the flexibility to run their operations without disturbing nearby residential areas.

Tire life

Liebherr's independent, double A-Arm front suspensions minimize lateral tire forces by maintaining contact with the ground over uneven roads or while turning the truck. Optimized for reduced wear when the truck is driving loaded, this suspension arrangement is designed to get the most useful life out of each tire.



Technical Data

Engine

Model	**MTU 20V4000 C23 Tier 2***
Gross horsepower @ 1,800 rpm**	3.000 kW / 4,023 HP***
No. of cylinders	20
Displacement	95,4 l / 5,822 in³
Wet weight	12.020 kg / 26,5000 lb
Crankcase	335 l / 88 gal
Cooling system	1.060 l / 280 gal

* Standard engine setting is USA/EPA Tier 2 compliant in emission-optimized (EO) mode. Fuel-optimized (FO) mode is optional for non-emission regulated countries

** Gross power definition according to ISO 3046 (ratings also correspond to SAE J 1995 standard conditions)

*** Optional 2.800 kW / 3,750 HP engine power setting. Consult factory for additional reduced engine power settings.

Model	**MTU 20V4000 C22 Tier 1***
Gross horsepower @ 1,800 rpm**	2.720 kW / 3,648 HP
No. of cylinders	20
Displacement	90 l / 5,490 in³
Wet weight	10.480 kg / 23,100 lb
Crankcase	390 l / 103 gal
Cooling system	870 l / 230 gal

* Standard engine setting is USA/EPA Tier 1 compliant.

** Gross power definition according to ISO 3046 (ratings also correspond to SAE J 1995 standard conditions)

Model	**Cummins QSK 78**
Gross horsepower @ 1,900 rpm*	2.610 kW / 3,500 HP
No. of cylinders	18
Displacement	78 l / 4,735 in³
Wet weight	11.300 kg / 24,912 lb
Crankcase	295 l / 78 gal
Cooling system	721 l / 191 gal

* Gross power definition according to SAE J 1995 standard conditions

Electric Drive System

Control System	Liebherr Litronic Plus AC drive system with IGBT technology
Control box	Liquid cooled power components, pressurized cabinet
Main alternator	AC brushless, direct drive, forced air cooling
Wheel motors	Litronic Plus AC induction motors, forced air cooling
Maximum speed*	54 km/h / 34 mph (with 43.7:1 gear ratio) 64 km/h / 40 mph (with 37.33:1 gear ratio) 45 km/h / 28 mph (with 53.33:1 gear ratio)
Cooling system	Variable speed AC motor with twin impeller radial cooling fans

* consult factory for proper selection of gear ratio based on site requirements

Braking Systems

Electric dynamic braking, forced air over quiet stainless steel resistor grids with dry disc service and secondary braking system.

Electric dynamic braking	Max: 4.500 kW / 6,035 HP Full dynamic braking down to zero. Single pedal automatic brake blending with service brakes below 1 km/hr.
Dynamic braking speed control	Operator adjustable, automatically limits truck speed on downhill grade when set
Adjustable speed limits	Automatic speed limits for empty and loaded truck adjustable for site requirements
Traction control	Litronic Plus traction control system. computer controlled in propel and dynamic braking, forward and reverse, all-wheel speed sensing
Service brakes front	Single disc, wheel speed, five calipers per wheel
Service brakes rear	Dual discs per side, one caliper per disc, armature speed
Hydraulic accumulators	2 x 7,6 l / 2 gal, separate isolated accumulator for front and rear axle (piston type)
Park brakes	Spring applied, pressure released, one caliper per each rear disc
Filtration	Cleanliness level ISO 15/13/11

Steering

Ackermann center point lever system, full hydraulic power steering with accumulator safety backup. Isolated from dump hydraulic system. Two double-acting hydraulic cylinders.

Hydraulic accumulator	170 l / 45 gal (piston type)
Filtration	Cleanliness level ISO 15/13/11
Turning radius (ISO 7457) - Tire centerline	17,2 m / 56' 5"
Vehicle clearance radius	19,95 m / 65' 5"

Dump System

Two double-stage, double-acting hoist cylinders with inter-stage and end cushioning in both directions. Electronic joystick with full modulating control in both extend and retract.

Dump angle	49° (45° with optional kick-out switch)
Cycle times	56 secs
Remote dump	Quick disconnects for external power dumping (buddy dump) accessible from ground level
Filtration	High pressure and return line filtration. Cleanliness level ISO 18/16/13

Technical Data

Suspensions System

Front	Double A-Arm with inclined king pin pivot, spindle, and nitrogen over oil suspensions with integral damping
Rear	Three bar linkage comprised of triangular upper link plus two bottom drag links and nitrogen over oil suspensions with integral damping

Tires

Tires	56/80 R63
	59/80 R63*

* 44“ rims only except Bridgestone which can operate on 41“ rims as well

Frame

Design	Closed box structure with multiple torque tube cross members, internal stiffeners and integrated front bumper. High strength steel castings are used in high stress areas.
Welding	Frame girders welded inside and out with ultrasonic inspection aligned with AWS D1.1

Cab

Deluxe cab with integrated ROPS and double wall design for optimum insulation. Fully adjustable air suspension operator seat with double lumbar support and full-size second seat for training requirements. Operator comfort controls include a tilt and telescoping steering wheel, heater, defroster and standard AC. Real-time vital truck information is easily displayed to the operator and also recorded for download.

Weights

Payload	363 t / 400 ton
Gross Vehicle Weight (GVW)	600 t / 661 ton
Chassis weight *	195 t / 215 ton
Body weight	Custom for each mine
Weight distribution	Empty – front 50 % / rear 50 % Loaded – front 33 % / rear 67 %

* depends on options fitted

Fluid Capacities

Fuel Tank	5.351 l / 1,414 gal
Hydraulic dump circuit	
- Tank	1.302 l / 344 gal
- System	1.514 l / 400 gal
Hydraulic brake and steering	
- Tank	924 l / 244 gal
- System	1.060 l / 280 gal
Planetary gear sets, each (2)	280 l / 74 gal
Front wheels, each (2)	60 l / 16 gal
Grease tank	54 kg / 120 lb

Body

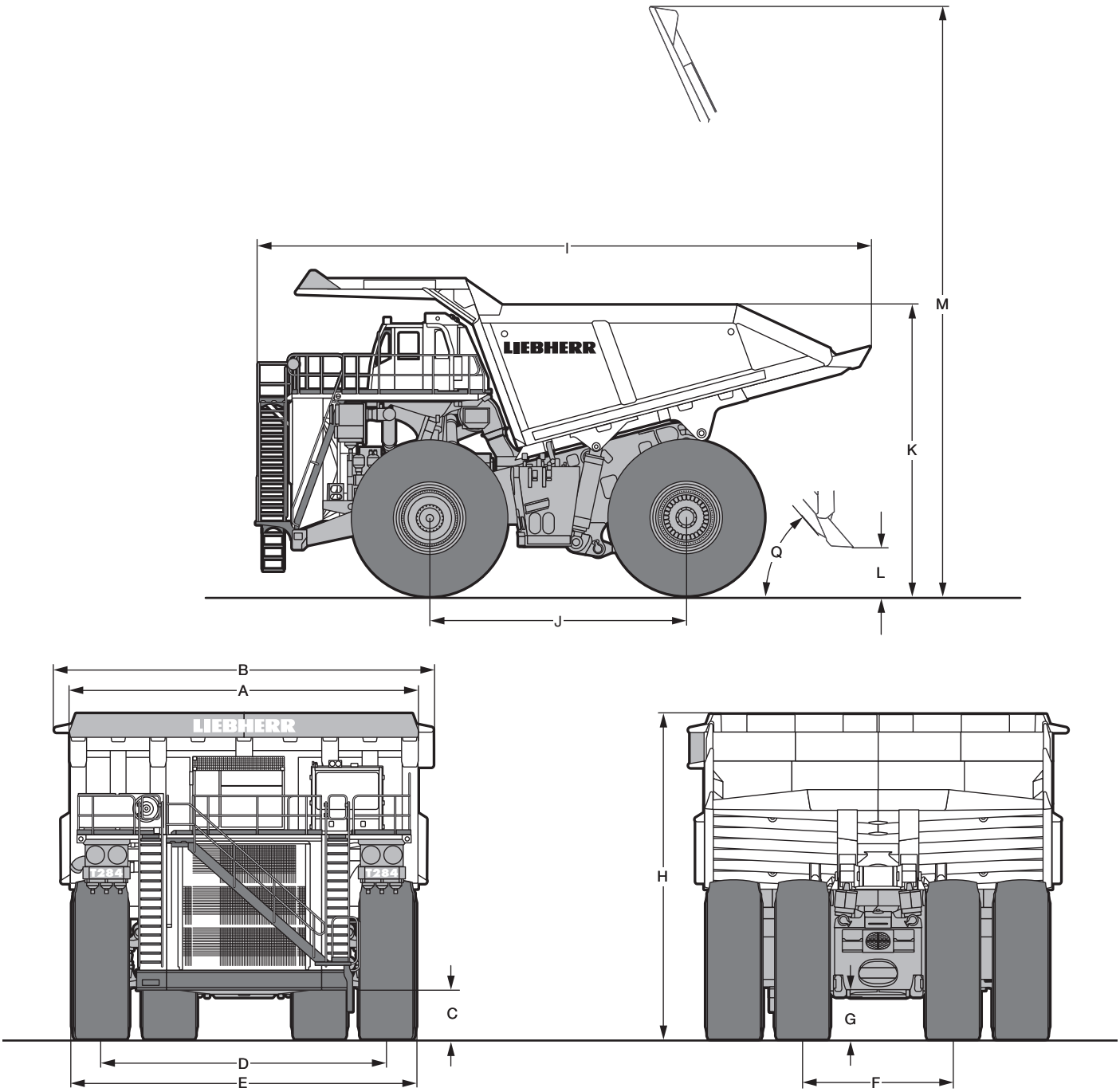
Body sizes are custom designed to fit Customer requirements and specific applications. Please contact factory for options.

Sound

Interior cab noise level (per ISO 6394:2008)	75 dB(A) sound pressure
Exterior noise emmision (per ISO 6393:2008)	126 dB(A) sound power

Technical Data

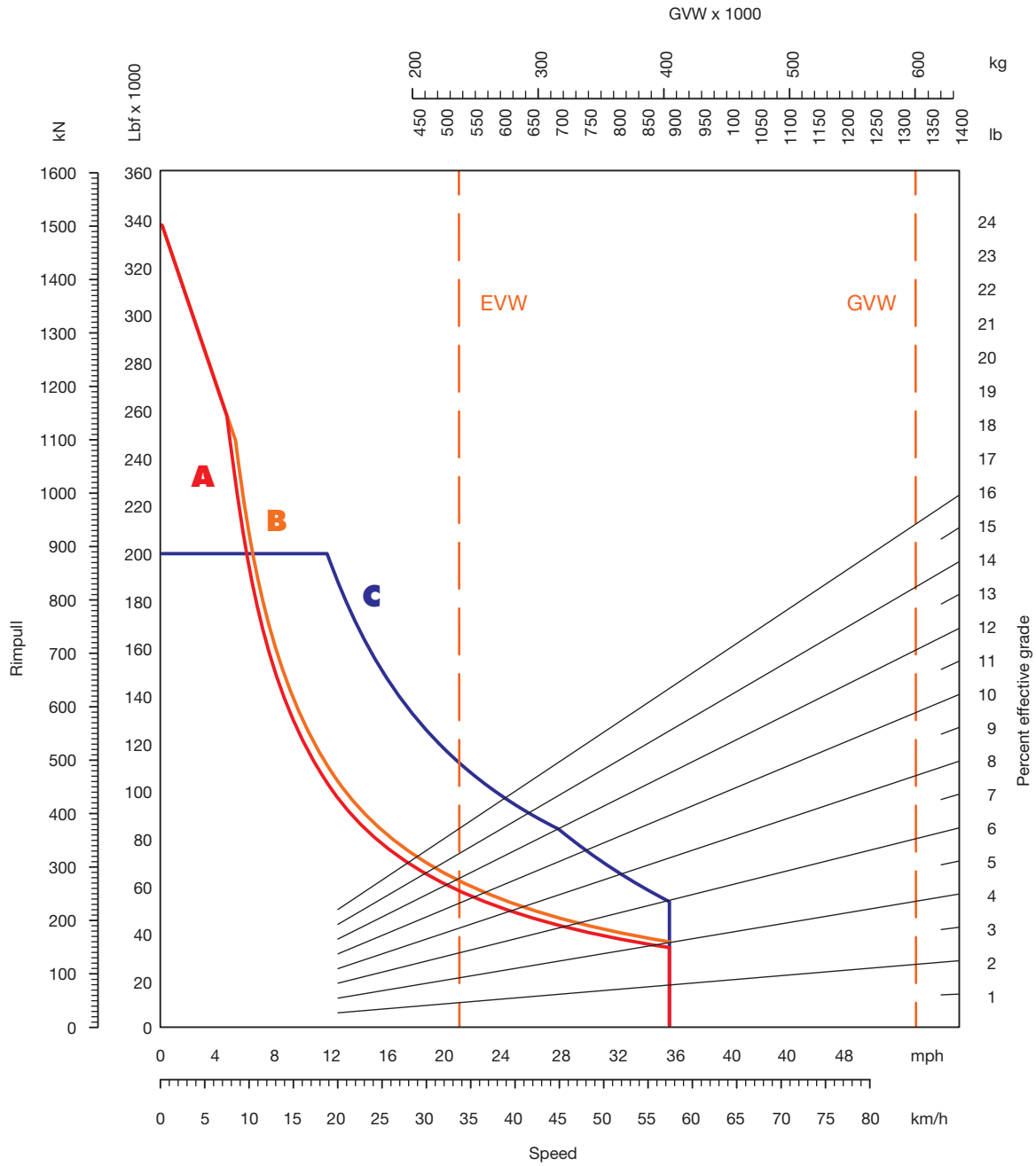
Dimensions



Dimensions		mm / ft in
A	Outside Body Width	8.891 mm/29'2"
B	Overall Truck Width	9.679 mm/31'8"
C	Bumper Ground Clearance	1.232 mm/4'0"
D	Centerline Front Tire Width	7.301 mm/24'0"
E	Overall Tire Width	8.797 mm/28'10"
F	Centerline Rear Dual Width	3.840 mm/12'6"
G	Rear Axle Clearance	1.140 mm/3'9"

Dimensions		mm / ft in
H	Front Canopy Height	8.294 mm/27'2"
I	Overall Truck Length	15.690 mm/51'5"
J	Wheelbase	6.553 mm/21'5"
K	Loading Height	7.425 mm/24'4"
L	Dump Clearance	1.249 mm/4'1"
M	Body Raised Height	15.050 mm/49'4"

Performance Curves



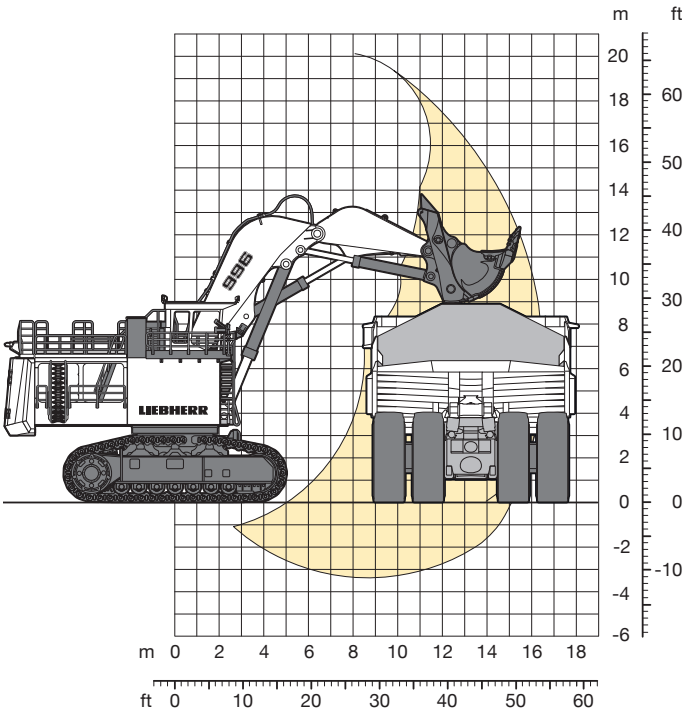
Performance Chart Parameters

Gross Power	2.800 kW / 3,755 HP (A) 3.000 kW / 4,023 HP (B)
Net Power	2.614 kW / 3,505 HP (A) 2.814 kW / 3,774 HP (B)
Tire size	59.80 R63
Gear ratio	43.7 to 1
Reference curves	A: Propulsion 2.800 kW / 3,755 HP B: Propulsion 3.000 kW / 4,023 HP C: Dynamic Braking (Retard)

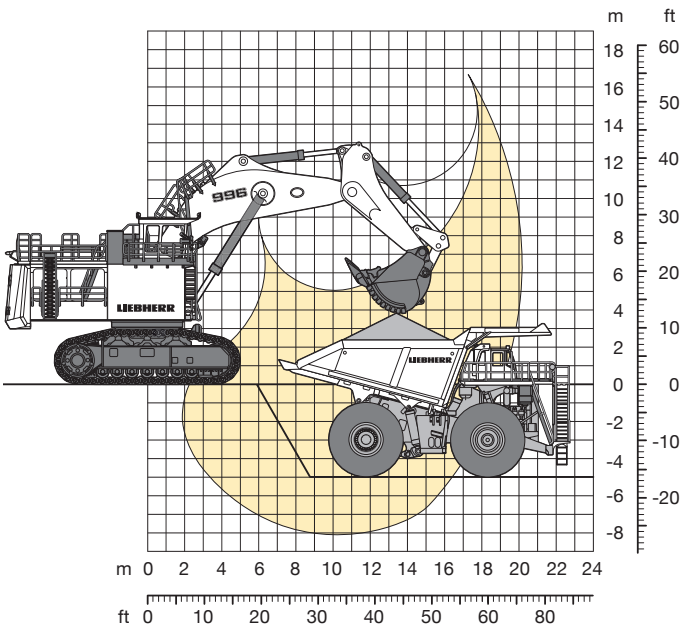
Note

The propulsion curve is calculated using net horsepower, therefore site specific and climatic variables will have an effect on the parasitic loss estimations.

Loading Charts

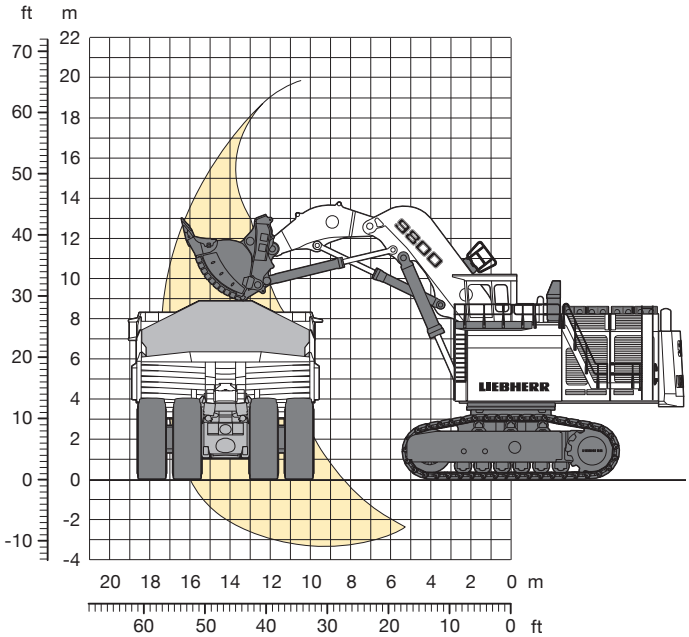


T 284 mining truck loaded by the Liebherr R 996 B hydraulic excavator in face shovel configuration	
Maximum dump height	12,9 m/42'3"
Truck loading height	7,4 m/24'4"
Passes to fill (given a 1,8 t/m³ density at 95% bucket fill factor)	6 passes

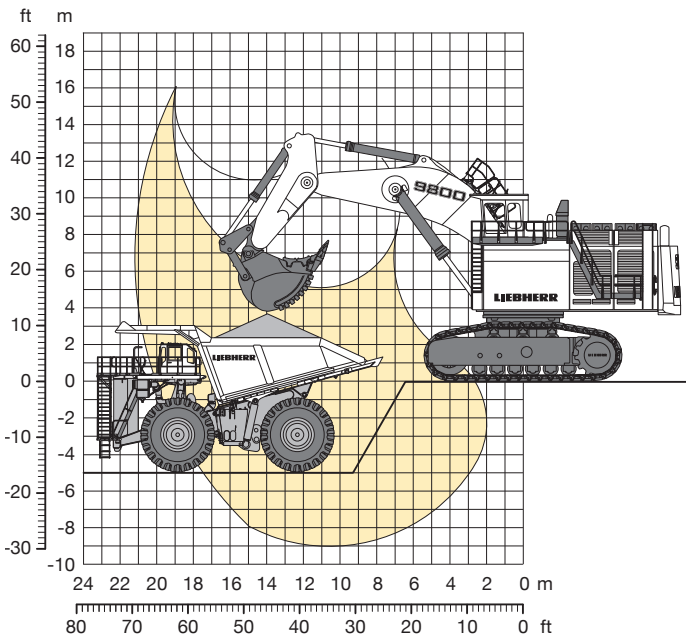


T 284 mining truck loaded by the Liebherr R 996 B hydraulic excavator in backhoe configuration	
Maximum dump height	10,7 m/34'11"
Truck loading height	7,4 m/24'4"
Passes to fill (given a 1,8 t/m³ density at 95% bucket fill factor)	6 passes

Loading Charts



T 284 mining truck loaded by the Liebherr R 9800 hydraulic excavator in face shovel configuration	
Maximum dump height	13 m/42'6"
Truck loading height	7,4 m/24'4"
Passes to fill (given a 1,8 t/m³ density at 95% bucket fill factor)	5 passes



T 284 mining truck loaded by the Liebherr R 9800 hydraulic excavator in backhoe configuration	
Maximum dump height	10,9 m/35'9"
Truck loading height	7,4 m/24'4"
Passes to fill (given a 1,8 t/m³ density at 95% bucket fill factor)	5 passes

Standard Equipment

Standard Equipment

Engine

- Fan clutch - variable speed, temperature controlled
- Air cleaners - two units with 2 elements per unit with electronic restriction monitoring in cab
- Air cleaner dust ejectors - automatic
- Starter - electric
- Roll out power module - radiator, engine and main alternator mounted on roll out sub frame
- Radiator - L&M (Mesabi) flexible core, w/side mounted header tank level gauge
- Exhaust - side-mounted mufflers with insulated exhaust pipes
- Prelube - pre-start engine oil pressurization to reduce dry engine turnover
- Multi-point exhaust temperature monitoring system (ETMS)
- Turbo thermal protection
- Fuel/water separator
- Oil centrifuge filter
- Primary and secondary fuel filters
- Engine ”roll over“ protection switch

24 V Electrical

- Batteries - 6 x 12 Volt, (3 series of 2), 1,200 CCA each at -18°C (0°F), 1,475 CCA at 0°C (32°F)
- Battery box lockouts - ground level, battery, propel and starter (single pole)
- Electrical system - 24 VDC with circuit breaker protection
- Emergency stops - in-cab and ground level

Operator Environment

- Climate control - combined heater and air conditioner w/multiple air ducts and filtered air
- Cup holder - 2 center console mounted
- Display screen - dimmable color touch screen w/operator information and warning
- Mirrors - drivers side (flat), offside (convex) and access ladder (convex)
- Power outlets - 12 VDC and 115 VAC
- Power windows - driver and passenger
- Pressurized cab - with fan on
- Radio ready - wiring, speakers and DIN fitting
- Integrated ROPS (ISO 3471:2008) and FOPS (ISO 3449:2005, Level II)
- Seat belt - high visability orange 3 point 2 inch wide
- Steering wheel - tilting and telescopic with horn and wiper control
- Sun visors - 2 windshield sun visors and 1 driver‘s door mounted blind
- Diagnostics interface - Ethernet, USB
- Windows - tempered and tinted glass 6 mm
- Windshield - laminated safety glass and tinted 9,5 mm
- Wipers - two speed electric and intermittent with self park and dual wiper arms
- Speedometer - km/h / mph
- Seats - fully adjustable driver and passenger heated seats with air suspension
- Storage shelves and storage compartment located behind seats

AC Drive system and controls

- Anti-roll back - in forward and reverse
- Brakes - dynamic braking w/automatic hydraulic brake blending and hydraulic service brakes
- Litronic Plus control cabinet - IGBT technology, liquid cooled, pressurized, filtered air inlet, ground fault warning and detection
- Gear assembly - Liebherr gears and wheel motors
- Gear ratio - 43.7:1
- Grid box - resistor grid control system and variable AC grid box blower motor
- Traction control system with four-wheel speed sensing

Lighting

- Access lights - 3 ladder, 1 superstructure
- Brake warning lights (cab mounted external) - forward facing retard and service brake (LED)
- Headlights (LED) - 4 x High beam, 4 x low beam
- Reverse lights - 2 x axle box, 1 x drivers side superstructure (LED)
- Service lights - 4 x engine bay, 2 x axle box (LED)
- Truck lights - tail, brake, retarder and indicators (LED)

Other

- Access ladders - 45° diagonal stair (drivers side access) with two side ladders w/flexible step
- Accumulators - certified, 1 steering 170 l (45 gal), 2 brakes 7,6 l (2 gal) (split front and rear brakes) 1 Control Valve 7,6 l (2 gal)
- Axle box - dual entry service access and rear air exhaust
- Catwalk - right and left side of engine
- Centralized service station - ground level, driver side, with fuel gauge
- Color - white / gray
- Grease system - automatic lubrication system
- Hydraulic coolers - 1 x hoist system, 2 x final drive gear oil
- Hydraulic filters - high pressure and return line brake, steering and hoist w/electronic monitoring
- Mud flaps - front and rear of hydraulic and fuel tanks
- Park brake - spring applied pressure release
- LED payload display - 2 x superstructure mounted
- Towing points - front and rear
- Recovery system - auxiliary connectors for brake, steering and hoist ”buddy system“
- Reverse alarm (2)
- Rims - bolt on, 2 x double gutter, 4 x single gutter
- Rock ejectors - bar type
- Service access ladders - right and left engine bay ladders w/cable steps
- Shut off valves - brake and steering and hoist w/electronic monitoring
- Sight gauges - brake, steering, hoist and radiator tanks and front wheel hub
- Fluid sampling - multi-sampling ports close to component
- Fall protection - multiple personnel tie off points

Optional Equipment

Optional Equipment

- Access stair - powered retractable stair to main diagonal stairway
- Battery box lockouts - ground level, battery (double Pole), propel and starter (single pole)
- Blue Truck identifier light - grill mounted
- Cold climate - diesel type engine heater, w/automatic control
- Color - Liebherr yellow/grey
- Curb / berm cornering lights (LED) - forward facing, superstructure mounted (DS and ODS)
- Dump body - liners, heated, tailgates, rock deflectors
- Dump body raise limit - 45° kick out switch
- Fire suppression systems
- Fog lights (LED) - 4 x bottom radiator mounted
- Adjustable access ladders - engine bay
- Gear ratios - 37.33 : 1 and 53.33 : 1
- Grill illumination light (LED)
- High altitude package (HAP)
- Hill cresting lights (LED) - 2 x top grill mounted
- Multiple language decals
- Overspeed light - externally mounted blue strobe on top of cab
- Park brake off / truck in neutral warning light (LED) - externally mounted on top of cab
- Reverse light (LED) - off drivers side superstructure
- Rock ejectors - chain type
- Sound attenuation package
- Centered dashboard gauge panel in metric and imperial
- Trolley capable
- Undercarriage protection - belly pan and hydraulic tank
- Proximity awareness - camera and radar system integrated into dashboard touchscreen
- Fatigue monitoring system
- Advanced camera system - four views (off driver side, driver side, reverse, and forward), integrated into dashboard touchscreen

Standard and optional equipment subject to change at manufacturer's discretion.
Please contact your local representative for further information.

The Liebherr Group of Companies

Wide Product Range

The Liebherr Group is one of the largest construction equipment manufacturers in the world. Liebherr's high-value products and services enjoy a high reputation in many other fields, too. The wide range includes domestic appliances, aerospace and transportation systems, machine tools and maritime cranes.

Exceptional Customer Benefit

Every product line provides a complete range of models in many different versions. With both their technical excellence and acknowledged quality, Liebherr products offer a maximum of customer benefits in practical application.

State-of-the-art Technology

To provide consistent, top quality products, Liebherr attaches great importance to each product area, its components and core technologies. Important modules and components are developed and manufactured in-house, for instance the entire drive and control technology for construction equipment and mining trucks.

Worldwide and Independent

Hans Liebherr founded the Liebherr family company in 1949. Since that time, the enterprise has steadily grown to a group of more than 120 companies with over 35,000 employees located on all continents. The corporate headquarters of the Group is Liebherr-International AG in Bulle, Switzerland. The Liebherr family is the sole owner of the company.

www.liebherr.us

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Liebherr Mining Equipment Newport News Co.
4100 Chestnut Avenue, Newport News, VA 23607, USA
☎ +1 (757) 245 5251, Fax +1 (757) 928 8755
www.liebherr.us, E-Mail: info.lme@liebherr.com